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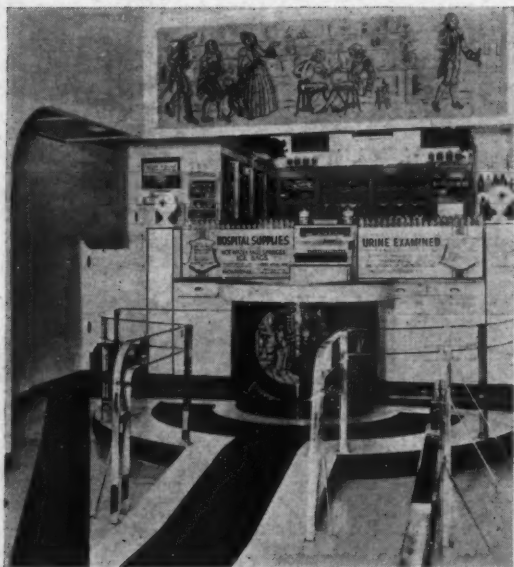
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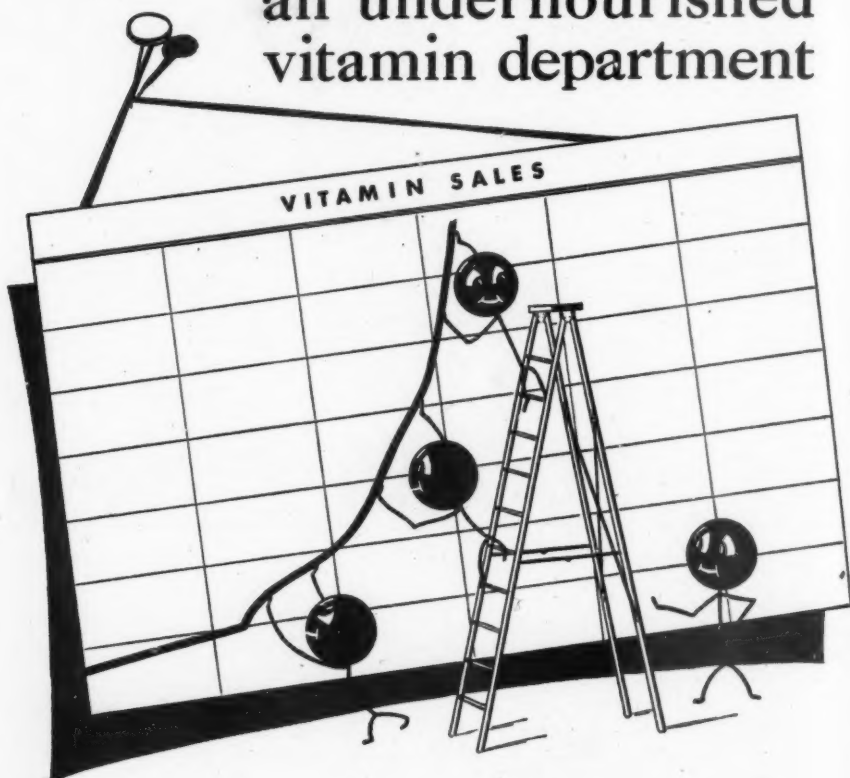
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O U R C O V E R

THE PHARMACY OF TOMORROW

ALL over the country pharmacy is being reborn and again professional atmosphere is the keynote of its form. Pictured on the cover is a modern pharmacy* which is far removed from those emporia of gadgets so common in the "thirties." The reasons for this change in pharmacy are complex and interwoven but the change itself is unmistakable. Those who love pharmacy and see in it an opportunity for real professional service and expression will find a stimulus in this trend but those who decry pharmacy and besmirch its name will continue to build their "tower of Babel" until it crashes around them.

With the continued growth of scientific diagnosis and treatment of disease, self-medication can but decline until the drug store will no longer find it profitable to cater to those who wish to dose themselves with the hundreds of cure-alls now so widely available. Instead, disease or illness will be treated with patent drugs having a specific action and use and available only on the written order of a competent physician. Pharmacy must and will follow this trend and it is a wholesome one.

We salute the future with all its advance, reform and beauty.

*Doctors' Pharmacy, Richmond Hill, N. Y.

E D I T O R I A L

PHARMACY AND SOCIALIZED MEDICINE

IT has often been said that great economic and social changes are a counterpart of war and this indeed is borne out in the current conflict. Change, however, does not necessarily mean advancement, as the decline of civilization in Europe in the Dark Ages gives perfect evidence. Only after long centuries was this retrogression in human affairs arrested and man again placed on the pathway of progress.

Those who now insist that we plan carefully for tomorrow, even before the war is won, are on solid footing since it is not beyond the realm of possibility that the increased burdens and restrictions of war will find us in an increasingly poorer position to think clearly and plan wisely. A portion of a speech given by General Smuts before the British Parliament is reprinted here since it establishes what our aim should be and our trend in all post-war planning:

"We are passing beyond the ordinary politics and political shibboleths. . . . Without feeding on illusions, without nursing the impossible, there is yet much in the common life of the people which can be remedied, much unnecessary inequality and privilege to be levelled away, much commonsense opportunity to be erected as the common birthright and public atmosphere for all to enjoy as of right. Health, housing, education, decent social amenities, provision against avoidable insecurities—all these simple goods and much more can be provided for all, and thus a common higher level of life be achieved for all."

We in pharmacy have every reason to be concerned with the health problem of the nation. It is indeed partly our joint responsibility with that of the medical profession to see to it that the plans that are adopted are not simply those of some starry-eyed idealist, who through regimentation and red tape would saddle our professions with a burden of regulations and complexities so that individual freedom by both patient and physician would be forever lost. And yet on the other hand all of us, who will face the truth, must admit that private enterprise and professional associations have fallen far short in translating medical advances into maximum human benefit. We know that adequate medical care has never been fully available to the

great majority of our people. This fact we must face and not take the reactionary viewpoint that all is well with the present arrangement.

A democratic government is still subject to the will of the people and, if completely socialized medicine with all its own pitfalls and evils is to be avoided, we of the medical and pharmaceutical professions must, with better understanding and mutual trust, prepare and offer to the American people some form of a guaranteed medical service plan involving freedom of choice of both physician and pharmacist but overcoming the many weaknesses of our present outmoded system.

To simply attempt to obstruct the coming of socialized medicine by defeatist tactics, of the order so far displayed, will but hasten its coming. The only positive way of preventing state medicine is to offer the public something better.

With the necessary regimentation and restrictions of war, people are already mentally conditioned to accept any reasonable proposal for medical care devoid of bureaucratic influence. The answer is simple—a form of insurance against all health hazards with the complete indorsement and support of the health professions but organized and administered by private enterprise. Let each doctor, dentist, nurse, and pharmacist become a salesman for this plan and not even Congress could or would stop its complete public acceptance.

Our professions are rapidly approaching a crossroads; either we act in a concerted and constructive manner, resolutely and effectively, or medicine and pharmacy, as we know them, will vanish in the field of public health. In their place will be a bureaucratic administration which will as always ignore the individual and bog down medical progress.

L. F. TICE.



DETERIORATION OF SPIRIT OF ETHYL NITRITE

By Robert P. Fischelis, Phar. D., Sc. D.,* John E. Bacon, Ch. E.**
and Donald W. Huber, P. D., Ph. C.***

SWEET Spirit of Nitre, known officially as Spirit of Ethyl Nitrite, has been an official drug since the appearance of the first U. S. Pharmacopœia in 1820. The United States Dispensatory refers to it as "an extremely popular diaphoretic in mild fevers, especially in children. Because of its action on the circulation it also at times exercises a diuretic influence." The same authority states that "Sweet Spirit of Nitre possesses the physiological properties of other nitrites" but that "it is rarely employed to produce the full physiological action of the nitrites, its chief employment being to relax the blood vessels of the skin and thereby increase the flow of sweat." The fact is that this drug is much more of a "home remedy" than a prescription product, and modern textbooks of pharmacology and therapeutics dismiss it with a very brief and uncomplimentary reference, such as "It is unstable and unreliable and is little used in therapeutics." (1)

Why then should any time be wasted over a consideration of the deterioration of this product when modern medical opinion is about to cast it into the ever-growing discard of forgotten drugs?

It takes many years to break family traditions and human habits and as long as there is a survivor of any family in which Sweet Spirit of Nitre was used by Mother to check a youngster's fever and the fever was reduced—and circumstances were such as to give the credit to Sweet Spirit of Nitre—just so long will there be a demand for that drug, and while that demand lasts there must be a satisfactory standard.

The medical profession as represented on the U. S. P. Revision Committee has signed this preparation's death certificate, so it has been eliminated from the U. S. P. XII. However, the extent of use of Spirit of Ethyl Nitrite is such as to continue it among the official drugs by inclusion in the National Formulary. This is justified in

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** Chief of the Bureau of Chemistry, New Jersey State Department of Health.

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order to provide a standard which will at least assure uniformity in strength and a satisfactory standard of quality.

Recent experiences in the testing of Sweet Spirit of Nitre purchased from retail pharmacists focussed attention on this problem again. A large percentage of the samples purchased were found to be below strength—some almost devoid of ethyl nitrite. In a few cases the samples left with the vendor were assayed by commercial laboratories and in some instances there was considerable variation between the results of the assays on our half of the sample and the portion of the sample left with the vendor by the inspector.

It was therefore decided to investigate the method of assay as well as the degree of deterioration of the product under various conditions. This has been done and our results as well as suggestions for the correction of unsatisfactory conditions revealed are set forth in the following paragraphs.

It is well known that Spirit of Ethyl Nitrite is a volatile product. The U. S. P. XI directions for storage read as follows: "Preserve in small, well-filled and tightly-stoppered bottles, in a cool, dark place, remote from fire."

The usual method of purchasing this product on the part of the pharmacist has been to buy a gallon or a pint and fill a stock container from the gallon bottle and place it or the pint bottle on the shelf. As the need for filling half ounce, one ounce or two ounce containers arises in the drug store, they are filled from the shelf bottle and the stock bottle is replaced on the shelf. Temperature and light are given little consideration. Hence there has been little observance of the official directions for storage. Some pharmacists pay too little attention to directions for storage. In the case of Sweet Spirit of Nitre such carelessness has often been found to be expensive for the pharmacist. But what of the sick person who depends upon this drug for relief?

A search of the literature revealed that considerable work has been done on this problem.

Kebler, Palkin and Ewing (2) report extensive experiments which led them to the conclusion that "properly prepared spirit of nitrous ether is comparatively stable and can be kept without material change much longer than the average pharmacy would ordinarily keep it and that for all ordinary purposes the U. S. P. Spirit of Nitrous Ether does not offer any great difficulties in order to be kept up to the standard strength, provided it is made up to the proper strength to begin with, carefully bottled and stoppered with paraffined corks."

They also conclude that "if the spirit is prepared with 95 per cent. alcohol, it is best to store it in a refrigerator or in small amber containers kept in diffused light. If stored in large amber bottles kept in diffused light, it is best to use absolute alcohol in its preparation."

Arny (3) and his co-workers found that "amber bottles kept it from one to two months when exposed to direct daylight, whereas in the dark the loss in nitrite was about 16% in twelve months. In diffused light, figures obtained were so erratic that we are inclined to the belief that deterioration is due to evaporation of the nitrite rather than to the influence of light. We were also unable to find much difference in deterioration between samples made by dissolving the nitrite in Alcohol U. S. P. or in absolute Alcohol."

Shannon (4) found that samples of Sweet Spirit of Nitre in filled containers, "securely stoppered and kept in a semi-dark place at a temperature of 65° to 75° F. retained their strength very well for the first six months, with a maximum loss of 0.53% and an average loss of 0.37%." He concludes that a Spirit of Ethyl Nitrite "when freshly prepared and manufactured to contain 4% of ethyl nitrite and stored in small dark-colored bottles in a cool place will remain standard strength for a long time. The pharmacist should make up this preparation in such quantity that the whole can be disposed of in a period of six months."

Perhaps the most illuminating study of the subject was reported by J. G. Roberts (5) who concludes that "Deterioration of Spirit of Ethyl Nitrite is due to either the decomposition of, or, to the volatilization of the ethyl nitrite" and that the "Decomposition is due to the action of light, and volatilization is due to the action of heat, to the imperfect sealing of containers or to insufficiently filled containers," and that "Carelessness or slowness in mixing the ethyl nitrite and alcohol is also a contributing factor." Roberts conducted a series of ten experiments with the object of determining the factor most responsible for the deterioration in quality and as a result of these experiments he found that "ethyl nitrite is easily dissipated from an alcoholic solution; that the action of direct sunlight is very destructive to it in flint glass containers; that partly filled containers are objectionable, and that it is bad practice to dispense numerous orders from the same container." He further concludes that, "The ideal method of storage is in small *completely filled*, amber bottles, kept in a refrigerator or ice-box."

Our findings support the conclusions that Ethyl Nitrite is easily dissipated from an alcoholic solution; that partly filled containers are objectionable and that it is bad practice to dispense numerous orders from the same container.

However, we are led to conclude from the experimental work reported below that these are the main factors in the deterioration of Spirit of Ethyl Nitrite and that any remedy should be directed toward the elimination of these factors in the storage and dispensing of the product.

Two samples of well known brands of U. S. P. Spirit of Ethyl Nitrite, designated as "A" and "B," were put up in

- (a) two ounce clear and amber colored bottles completely filled, half of which were kept at room temperature and the other half at 42° F.;
- (b) four ounce clear and amber colored bottle half filled and stored in the same manner as under (a).

A sufficient number of bottles were filled so that assays could be carried out each week for four weeks and then each month for two months, or a total period of more than twelve weeks.

The following determinations were made: an ethyl nitrite assay by the U. S. P. X (nitrometer) method and by the U. S. P. XI method modified as indicated below; specific gravity, acidity and pH.

Our modification of the U. S. P. XI assay method introduced a more copious flow of CO₂ than that prescribed in the official method to remove oxygen, preceding the liberation of iodine in the titration. Without this modification our laboratory is unable to obtain consistent results by the use of the U. S. P. XI assay process.

During the first and second weeks of the experiment all determinations on each sample were completed before the next sample was tested. During the third and fourth weeks it was deemed more expeditious to run the nitrometer assays, acidity, specific gravity and pH on all samples in the morning and carry out the U. S. P. XI modified assays for ethyl nitrite in the afternoon. We stress this change in laboratory procedure particularly because an average loss of .46% ethyl nitrite was encountered in the samples assayed in the afternoon as compared with assays made on the same samples in the morning of the same day. On the other hand, the results of both assays made on the same samples in immediate sequence checked closely during the first and second weeks. See starred (*) results in Table No. 1 for

TABLE NO. I
ETHYL NITRITE CONTENTS OF SPIRIT OF ETHYL NITRITE
STORED

Sample	Original Assay %	Method	After 1 week % Loss %		After 2 weeks % Loss %		After 3 weeks % Loss %		After 4 weeks % Loss %		After 8 weeks % Loss %		After 12 weeks % Loss %		Total Percentage Loss	Remarks
AC ₂ C	Ethyl Nitrite 3.78	Nitrometer USP Modified	3.63 3.58	.15 .20	3.60 3.52	.18 .26	3.54 3.15*	.24 .63*	3.50 3.02*	.28 .76*	.. 3.43	.. .35	.. 3.34	.. .44	11.6	2 oz. clear glass full, keep at room temperature.
AC ₂ A	3.78	Nitrometer USP Modified	3.61 3.60	.17 .18	3.58 3.54	.20 .24	3.53 3.16*	.25 .62*	3.48 3.04*	.30 .74*	.. 3.42	.. .36	.. 3.33	.. .45	11.9	Same, amber glass.
AC ₄ C	3.78	Nitrometer USP Modified	3.36 3.41	.42 .37	3.34 3.39	.44 .39	3.28 3.02*	.50 .76*	3.25 2.76*	.53 1.02*	.. 3.19	.. .59	.. 3.11	.. .67	17.7	4 oz. clear glass one-half full, keep at room temperature.
AC ₄ A	3.78	Nitrometer USP Modified	3.50 3.44	.28 .34	3.47 3.42	.31 .36	3.40 3.04*	.38 .74*	3.36 2.88*	.42 .92*	.. 3.29	.. .49	.. 3.20	.. .58	15.3	Same, amber glass.
AR ₂ C	3.78	Nitrometer USP Modified	3.65 3.59	.13 .19	3.61 3.54	.17 .24	3.57 3.12*	.21 .66*	3.51 3.06*	.27 .72*	.. 3.46	.. .32	.. 3.38	.. .40	10.5	2 oz. clear glass full, keep at 42° F.
AR ₂ A	3.78	Nitrometer USP Modified	3.75 3.71	.03 .07	3.69 3.62	.09 .16	3.63 3.25*	.15 .53*	3.59 3.08*	.19 .70*	.. 3.53	.. .25	.. 3.44	.. .34	8.9	Same, amber glass.
AR ₄ C	3.78	Nitrometer USP Modified	3.53 3.49	.25 .29	3.49 3.44	.29 .34	3.43 3.00*	.35 .78*	3.39 2.91*	.39 .87*	.. 3.33	.. .45	.. 3.23	.. .55	14.5	4 oz. clear glass one-half full, 42° F.
AR ₄ A	3.78	Nitrometer USP Modified	3.73 3.67	.05 .11	3.67 3.60	.11 .18	3.61 3.16*	.17 .62*	3.55 3.04*	.23 .74*	.. 3.49	.. .29	.. 3.39	.. .39	10.3	Same, amber glass.
BC ₂ C	3.52	Nitrometer USP Modified	3.21 3.17	.31 .35	3.14 3.13	.38 .39	3.07 2.65*	.45 .87*	3.00 2.53*	.52 .99*	.. 2.94	.. .58	.. 2.86	.. .66	18.7	2 oz. clear glass full, keep at room temperature.
BC ₂ A	3.52	Nitrometer USP Modified	3.32 3.32	.20 .20	3.27 3.26	.25 .26	3.21 2.80*	.31 .72*	3.16 2.67*	.36 .85*	.. 3.08	.. .44	.. 3.01	.. .51	14.4	Same, amber glass.
BC ₄ C	3.52	Nitrometer USP Modified	3.23 3.12	.29 .40	3.20 3.11	.32 .41	3.12 2.70*	.40 .82*	3.07 2.51*	.45 1.01*	.. 2.99	.. .53	.. 2.92	.. .60	17.0	4 oz. clear glass one-half full, room temperature.
BC ₄ A	3.52	Nitrometer USP Modified	3.26 3.20	.26 .32	3.21 3.16	.31 .36	3.15 2.71*	.37 .81*	3.09 2.55*	.43 .97*	.. 3.00	.. .52	.. 2.92	.. .60	17.0	Same, amber glass.
BR ₂ C	3.52	Nitrometer USP Modified	3.23 3.19	.29 .33	3.19 3.14	.33 .38	3.14 2.70*	.38 .82*	3.08 2.58*	.44 .94*	.. 3.01	.. .51	.. 2.93	.. .59	16.7	2 oz. clear glass full, keep at 42° F.
BR ₂ A	3.52	Nitrometer USP Modified	3.25 3.20	.27 .32	3.20 3.17	.32 .35	3.13 2.68*	.39 .84*	3.06 2.50*	.46 1.02*	.. 2.98	.. .54	.. 2.91	.. .61	17.3	Same, amber glass.
BR ₄ C	3.52	Nitrometer USP Modified	3.22 3.17	.30 .35	3.19 3.12	.33 .40	3.11 2.60*	.41 .92*	3.06 2.48*	.46 1.04*	.. 2.97	.. .55	.. 2.90	.. .62	17.6	4 oz. clear glass one-half full, 42° F.
BR ₄ A	3.52	Nitrometer USP Modified	3.27 3.23	.25 .29	3.22 3.16	.30 .36	3.13 2.61*	.39 .91*	3.07 2.51*	.45 1.01*	.. 2.97	.. .55	.. 2.89	.. .63	17.8	Same, amber glass.

TABLE No. I
CONTENTS OF SPIRIT OF ETHYL NITRITE

STORED										Total Percentage Loss
After 3 weeks		After 4 weeks		After 8 weeks		After 12 weeks				
% Loss	%	% Loss	%	% Loss	%	% Loss	%			
3.54, 3.15*	.24 .63*	3.50 3.02*	.28 .76*	.. 3.43	.. .35	.. 3.34	.. .44	11.6		
3.53 3.16*	.25 .62*	3.48 3.04*	.30 .74*	.. 3.42	.. .36	.. 3.33	.. .45	11.9		
3.28 3.02*	.50 .76*	3.25 2.76*	.53 1.02*	.. 3.19	.. .59	.. 3.11	.. .67	17.7		
3.40 3.04*	.38 .74*	3.36 2.88*	.42 .92*	.. 3.29	.. .49	.. 3.20	.. .58	15.3		
3.57 3.12*	.21 .66*	3.51 3.06*	.27 .72*	.. 3.46	.. .32	.. 3.38	.. .40	10.5		
3.63 3.25*	.15 .53*	3.59 3.08*	.19 .70*	.. 3.53	.. .25	.. 3.44	.. .34	8.9		
3.43 3.00*	.35 .78*	3.39 2.91*	.39 .87*	.. 3.33	.. .45	.. 3.23	.. .55	14.5		
3.61 3.16*	.17 .62*	3.55 3.04*	.23 .74*	.. 3.49	.. .29	.. 3.39	.. .39	10.3		
3.07 2.65*	.45 .87*	3.00 2.53*	.52 .99*	.. 2.94	.. .58	.. 2.86	.. .66	18.7		
3.21 2.80*	.31 .72*	3.16 2.67*	.36 .85*	.. 3.08	.. .44	.. 3.01	.. .51	14.4		
3.12 2.70*	.40 .82*	3.07 2.51*	.45 1.01*	.. 2.99	.. .53	.. 2.92	.. .60	17.0		
3.15 2.71*	.37 .81*	3.09 2.55*	.43 .97*	.. 3.00	.. .52	.. 2.92	.. .60	17.0		
3.14 2.70*	.38 .82*	3.08 2.58*	.44 .94*	.. 3.01	.. .51	.. 2.93	.. .59	16.7		
3.13 2.68*	.39 .84*	3.06 2.50*	.46 1.02*	.. 2.98	.. .54	.. 2.91	.. .61	17.3		
3.11 2.60*	.41 .92*	3.06 2.48*	.46 1.04*	.. 2.97	.. .55	.. 2.90	.. .62	17.6		
3.13 2.61*	.39 .91*	3.07 2.51*	.45 1.01*	.. 2.97	.. .55	.. 2.89	.. .63	17.8		

Remarks

2 oz. clear glass bottles,
full, keep at room tem-
perature.

Same, amber glass bot-
tles.

4 oz. clear glass bottles,
one-half full, keep at
room temperature.

Same, amber glass bot-
tles.

2 oz. clear glass bottles,
full, keep at 42° F.

Same, amber glass bot-
tles.

4 oz. clear glass bottles,
one-half full, keep at
42° F.

Same, amber glass bot-
tles.

2 oz. clear glass bottles,
full, keep at room tem-
perature.

Same, amber glass bot-
tles.

4 oz. clear glass bottles,
one-half full, keep at
room temperature.

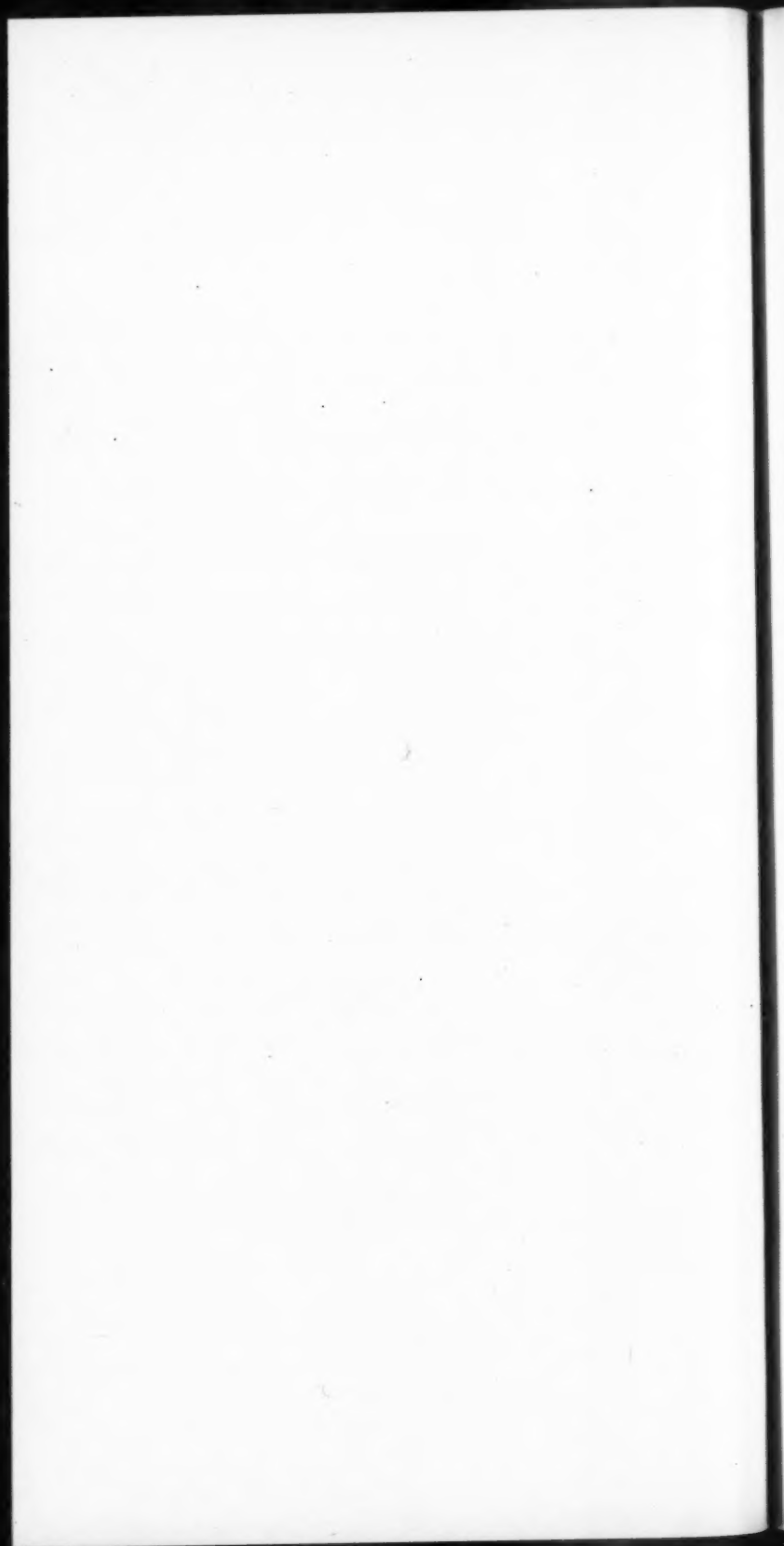
Same, amber glass bot-
tles.

2 oz. clear glass bottles,
full, keep at 42° F.

Same, amber glass bot-
tles.

4 oz. clear glass bottles,
one-half full, keep at
42° F.

Same, amber glass bot-
tles.



losses. In order to conserve material, we returned to each container the Spirit of Ethyl Nitrite used in those determinations not vitiating the sample. It became evident from the assays made in the early weeks of the experiment that the loss in ethyl nitrite revealed by these assays was in proportion to the number of times the sample was exposed to the air and the length of time of such exposures. It was, therefore, decided to adopt a different procedure with the samples to be assayed after eight and twelve weeks storage. The following procedures were adopted:

Procedure No. 1. Four samples of the "A" and "B" series were assayed as follows: Ethyl nitrite determined by the U. S. P. XI modified assay, followed by determination of specific gravity *only*. Contents returned to respective bottles in each case and assayed again for ethyl nitrite only, in the afternoon of the same day and also in the morning and afternoon of the following day. These results are shown in Table No. 2 and confirmed the previous findings, namely a slight loss of ethyl nitrite averaging a total of .16%, after three distinct handlings.

Procedure No. 2. Two samples of the "A" and "B" series were assayed as follows: Ethyl nitrite determined by the U. S. P. XI modified assay, with mock acidity and pH determinations run, in addition to specific gravity, on the samples assayed in the morning of the first day only. The results are given in Table No. 3 and show, as before, an appreciable loss of ethyl nitrite, averaging .58%, of which .48% is accounted for in the first handling involving pH and acidity determinations and only .1% in the next two handlings which is accounted for by losses due to the saturation of the air with ethyl nitrite in the unfilled bottles.

Procedure No. 3. The remaining samples in series "A" and "B" were assayed as under Procedure No. 1, with specific gravity, mock acidity and pH determinations made after each ethyl nitrite assay both morning and afternoon, on each day. Results are shown in Table No. 4, and indicate a serious loss of ethyl nitrite averaging .49% after each series of acidity and pH determinations and totaling 1.48%.

TABLE No. 2

LOSS IN ETHYL NITRITE CONTENT OF SPIRIT OF ETHYL NITRITE
FOLLOWING ANALYTICAL PROCEDURE NUMBER 1.

Sample	Stored	First Day			Second Day			% Loss	Total % Loss	Total Percentage Loss
		A.M.	P.M.	% Loss	A.M.	Loss	P.M.			
AC ₂ C	8 wks.	3.43	3.40	.03	3.34	.06	3.30	.04	.13	3.7
	12 wks.	3.34	3.28	.06	3.22	.06	3.17	.05	.17	5.0
AC ₂ A	8 wks.	3.42	3.38	.04	3.33	.05	3.28	.05	.14	4.0
	12 wks.	3.33	3.28	.05	3.23	.05	3.18	.05	.15	4.5
AC ₄ C	8 wks.	3.19	3.14	.05	3.08	.06	3.02	.06	.17	5.6
	12 wks.	3.11	3.05	.06	2.99	.06	2.93	.06	.18	5.7
AC ₄ A	8 wks.	3.29	3.23	.06	3.16	.07	3.11	.05	.18	5.4
	12 wks.	3.20	3.15	.05	3.09	.06	3.04	.05	.16	5.0
BC ₂ C	8 wks.	2.94	2.89	.05	2.83	.06	2.78	.05	.16	5.4
	12 wks.	2.86	2.81	.05	2.76	.05	2.71	.05	.15	5.2
BC ₂ A	8 wks.	3.08	3.02	.06	2.97	.05	2.93	.04	.15	4.8
	12 wks.	3.01	2.95	.06	2.89	.06	2.83	.06	.18	5.9
BC ₄ C	8 wks.	2.99	2.93	.06	2.87	.06	2.82	.05	.17	5.6
	12 wks.	2.92	2.87	.05	2.81	.06	2.75	.06	.17	5.8
BC ₄ A	8 wks.	3.00	2.92	.08	2.85	.07	2.79	.06	.21	7.0
	12 wks.	2.92	2.86	.06	2.81	.05	2.76	.05	.16	5.4

TABLE No. 3

LOSS IN ETHYL NITRITE CONTENT OF SPIRIT OF ETHYL NITRITE
FOLLOWING ANALYTICAL PROCEDURE NUMBER 2.

Sample	Stored	First Day			Second Day			% Loss	Total % Loss	Total Percentage Loss
		A.M.	P.M.	% Loss	A.M.	Loss	P.M.			
AR ₂ C	8 wks.	3.46	3.02	.44	2.95	.07	2.90	.05	.56	16.2
	12 wks.	3.38	2.93	.45	2.87	.06	2.82	.05	.56	16.5
AR ₂ A	8 wks.	3.53	3.07	.46	2.99	.08	2.92	.07	.61	17.2
	12 wks.	3.40	2.98	.42	2.92	.06	2.85	.07	.55	16.1
BR ₂ C	8 wks.	3.01	2.50	.51	2.43	.07	2.37	.06	.64	21.2
	12 wks.	2.93	2.46	.47	2.41	.05	2.36	.05	.57	19.1
BR ₂ A	8 wks.	2.98	2.50	.48	2.44	.06	2.37	.07	.61	20.4
	12 wks.	2.91	2.47	.44	2.43	.04	2.37	.06	.54	18.5

TABLE No. 4

LOSS IN ETHYL NITRITE CONTENT OF SPIRIT OF ETHYL NITRITE
FOLLOWING ANALYTICAL PROCEDURE NUMBER 3

Sample	Stored	First Day			Second Day			% Loss	Total % Loss	Total Percentage Loss
		A.M.	P.M.	% Loss	A.M.	Loss	P.M.			
AR ₄ C	8 wks.	3.33	2.80	.53	2.26	.54	1.78	.48	1.55	46.5
	12 wks.	3.23	2.78	.45	2.28	.50	1.87	.41	1.36	42.1
AR ₄ A	8 wks.	3.49	2.96	.53	2.30	.66	1.79	.51	1.70	48.7
	12 wks.	3.39	2.95	.44	2.47	.48	2.05	.42	1.34	39.5
BR ₄ C	8 wks.	2.97	2.45	.52	1.92	.53	1.48	.44	1.49	50.1
	12 wks.	2.90	2.44	.46	2.00	.44	1.53	.47	1.37	47.2
BR ₄ A	8 wks.	2.97	2.45	.52	1.92	.53	1.48	.44	1.49	50.1
	12 wks.	2.89	2.42	.47	1.93	.49	1.50	.43	1.39	48.0

To determine if the loss of ethyl nitrite was due to volatilization or oxidation, a sample of Spirit of Ethyl Nitrite, which assayed 3.32 gms. of ethyl nitrite per 100 cc. was placed in a 1000 cc. bottle, fitted with a closed funnel tube and connected with a train of two test tubes, each containing 25 cc. of alcohol. After standing for two hours, the bottle was filled with water through the funnel tube, driving the air and any volatilized ethyl nitrite through the alcohol train.

When assayed, the alcohol contained ethyl nitrite equivalent to .496 gms. per 100 cc., a mechanical loss due to the admixture of vapors of ethyl nitrite with the 900 cc. of air overlying the sample.

Another 100 cc. portion of this same sample of Spirit of Ethyl Nitrite was placed in a 1000 cc. bottle, which was then tightly stoppered and allowed to stand two hours. The sample was then assayed and found to contain 2.91 gms. ethyl nitrite per 100 cc., a loss of .41 gms., which is slightly less than the loss occurring in the preceding experiment but about what would be expected as the air was sealed in this bottle, while in the previous test a slight but continuous bubbling of gas through the alcohol train was noticed.

It was thus definitely established that losses of ethyl nitrite occurring during exposure to the atmosphere were mostly mechanical and not due to decomposition or oxidization. This observance is particularly pertinent in the collection of official samples where the law provides that samples be divided and sealed separately.

Conclusions

1. Deterioration of U. S. P. Spirit of Ethyl Nitrite (now N. F.) occurred under all conditions of storage represented in these experiments but appears to be least extensive in the completely filled bottles kept at 42° F.

2. Acidity and pH apparently exert no appreciable effect upon the deterioration or preservation of Spirit of Ethyl Nitrite.

3. Mechanical losses, due to volatility of ethyl nitrite, occurred when containers of Spirit of Ethyl Nitrite were not kept completely filled and when the Spirit of Ethyl Nitrite was exposed to the air. This bears out in part the directions for preservation as given in the U. S. P. (now N. F.) although we would suggest the use of the words "completely filled" in place of "well-filled."

4. Inspection samples should be divided in a manner to obviate mechanical losses.

5. Spirit of Ethyl Nitrite kept by pharmacists in bulk containers and dispensed from "stock bottles" is bound to reach the consumer as a deteriorated product because of the continuous volatilization of ethyl nitrite, with consequent varying degrees of mechanical loss depending upon the number of times the "stock bottle" is opened and length of each exposure.

6. As a safeguard pharmacists should dispense Spirit of Ethyl Nitrite only in completely filled containers bottled by the maker immediately after assay. The container should bear the date of manufacture. Spirit of Ethyl Nitrite which is more than three months old should be discarded.

7. Modification of the U. S. P. XI assay for ethyl nitrite consisting of increasing the volume of carbon dioxide entering the reaction chamber prior to introducing the sample gave satisfactory checks with the nitrometer (U. S. P. X) assay. Without this modification consistent results by the use of U. S. P. XI assay could not be obtained.

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IMPROVEMENT OF COLOR VISION BY VITAMIN INTAKE

By Donald P. LeGalley, Ph. D.,* and J. W. E. Harrisson,
P. D., Ph. M.**

A SERIES of experiments have been performed to test whether or not large dosages of Vitamin A, Vitamin B₁, (Thiamine Hydrochloride) or Vitamin B₂ (Riboflavin) produce improvements in the color vision of color blind subjects.

When it is realized that approximately 4% of the men applying to the armed services are turned down because of defective color vision, then the desirability of finding a method of improving this defect is realized. Of course on the average this same percentage of rejections applies to all industries where color blindness or lack of clear color vision is a liability, such as airplane pilots, railroad employees, and chemists.

Our attention was called to this problem, when quite a number of our students who were trying to join the various armed reserve forces were turned down because of defective color vision. We were interested first in testing these students to see just how badly color blind they were, and second to see if this defect could be improved by any dietary procedure such as an increased vitamin intake.

The total number of color blind subjects available were divided up into four groups of four each, so that each group contained on the average about the same degree of color blindness. During the experiment some groups were reduced to three because the subjects were called by the selective service, joined the armed forces, or, as in one case, left school, for other reasons.

One group of four was run as a control. i. e. they were not given additional vitamins, but tests were made on them once a week at the

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same time, and in the same way that tests were made on the rest of the groups. To another group of four was administered 30,000 U. S. P. units of Vitamin A daily. Since the normal minimum adult need of Vitamin A is 5,000 U. S. P. units, they received a dosage about six times normal in addition to that obtained in their regular diet. To the members of another group of four was given 8 mg. of Vitamin B₁ daily. Since the normal minimum daily need of this vitamin is about 1 mg., their daily dosage was about eight times normal. The fourth group of four received 16 mg. of Vitamin B₂ daily. The normal minimum daily dosage of this vitamin is about 2 mg., so these subjects also had a dosage eight times normal.

No attempt was made to control the daily character of the food and it may be presumed that all were on an average diet.

The color vision of each subject was tested carefully at the beginning before any vitamins were administered, and each week thereafter for a period of ten weeks. The tests were made with the aid of color blind charts secured from the American Optical Co. These charts are a combination of the best Ishihara and Stilling charts, along with some American charts, and are made up of colored dots arranged so as to form certain numbers, letters, traces, or blanks.

The color blind sees different numbers, letters, or traces, than the normal person, or none at all, and therefore his color vision can be measured without naming the colors.

There is a total of eighty-five possible answers, and a careful record was kept of the number of right and wrong answers given by each subject at each reading. The number of wrong answers divided by eighty-five was taken as the per cent. of color vision deficiency. The charts were cut apart and shuffled like a deck of cards each week, so that the subject had no chance of memorizing or learning them in sequence. The operator was very careful not to indicate to the subject whether the answers given were correct; he merely recorded the numbers, etc., which the subject read.

Illumination was furnished by a large north light window which covered one side of the room. No artificial illumination was used. No readings were taken on extremely dark days, although when this point was tested it was found to have very little influence on the reading of the color charts. All subjects made their readings on the same afternoon, and therefore the illumination was about equal for all. In addition the intensity was measured with a Weston exposure meter

and was found not to vary appreciably from week to week. To check this point further, two non-color-blind subjects were asked to read the charts each week along with the rest of the group. Of the eighty-five possible answers, one subject never gave a single wrong answer, while the other one averaged two errors per week, but these did not depend on whether the day was bright or dark.

It is recognized these charts are probably not as accurate a method of measuring color blindness as the skein matching procedure, or the intensity measuring method with the spectroscope used by the Bureau of Standards. But since the chart method is so convenient, and since the patient can be tested in five minutes by this method, they were used. The little which is lost in accuracy is made up for by the time one saves, and the ease with which the determinations can be made.

It is also recognized that several workers, among them Dunlap and Loken (1), have recorded in the scientific literature improvements of color blindness as a result of administering large dosages of Vitamin A. However, it appeared desirable to check these results and in addition to make studies with Vitamin B₁ and Vitamin B₂. It is also recognized that groups of four represent a small sampling, but it is believed that since the results within a group checked one another, that the average result is fairly reliable.

One of the purposes of running a control group was to measure the amount of "learning," due to the fact that the subjects were reading the same charts each week. The tests showed that the average improvement of this group over a period of ten weeks was only 2.2%, which indicated that "learning" was not appreciable. Additional tests indicated that the charts were a true test of color vision. Besides shuffling them thoroughly between the readings each week, sometimes repeat readings were taken at random. Also if either "Learning" or "Memory" were factors, there would have been a rise in the number of wrong answers taken immediately after the two-week Christmas holiday recess, since there would have been some "forgetting" during this period.

RESULTS OF TEST

Vitamin Group	Normal Min. Daily Need	Dosage Administered	Average Improvement	Additional Improvement After Switching
Control		None	2.2%	X X X
A	5,000 U. S. P. units	30,000 U. S. P. units	20.7%	A to B ₁ 11.8%
B ₁	1 Mg.	8 Mg.	22.3%	B ₁ to A 10.8%
B ₂	2 Mg.	16 Mg.	2.5%	X X X

The results of the tests are shown in the table. Essentially the points are: whereas the control group showed an improvement of only 2.2%, those to whom 30,000 U. S. P. units of Vitamin A were administered showed an average improvement of 20.7%, and those to whom 8 mg. of Vitamin B₁ was administered showed an average improvement of 22.3% over the ten-week period. On the other hand, those to whom the 16 mg. of Vitamin B₂ was administered showed an improvement of only 2.5% over the same period. It might be concluded that since the 20.7% improvement for Vitamin A subjects, and the 22.3% improvement for the Vitamin B₁ subjects is so much greater than the 2.2% improvement of the controls that concentrated dosages of either of these two vitamins is effective in producing improvement in color vision. As mentioned, results have been published for Vitamin A, but it is believed that this is the first time that Vitamin B₁ has also been found to be effective. On the other hand, large dosages of Vitamin B₂ were found to produce practically no improvement in color vision. It is of interest to note that most of the improvement in the case of the Vitamin A subjects occurred in the first five weeks, after which the readings reached a plateau. The Vitamin B₁ subjects took longer to reach this plateau, but in both cases with Vitamin A and B₁ nearly all of the improvement possible was secured within the ten-week period.

After the plateau was reached with one vitamin, tests were made to note if the addition of another vitamin would produce further improvement. In the case of those to whom the 30,000 U. S. P. units of Vitamin A had been originally administered, and who had reached the plateau of improvement, 8 mg. of Vitamin B₁ per day was administered for another period of ten weeks. In this case an additional improvement of 11.8% was noted. In the case of those who had received the Vitamin B₁ during the first ten-week period, 30,000 U. S. P. units per day of Vitamin A was administered. This

group showed an additional improvement which averaged 10.8%. Since in both cases the additional improvements were produced after they had reached a plateau with the first vitamin it can be concluded that both Vitamin A and Vitamin B₁ are effective in producing improvement in color vision even under adverse conditions. When further improvement was tried by administering 16 mg. of Vitamin B₂ over a second ten-week period, it was found that when it followed Vitamin A the improvement averaged 2.7%, while when it followed Vitamin B₁ the average improvement was 3.5%. In both of these cases the improvement produced by additional Vitamin B₂ can be considered negligible.

The vitamins for this experiment were kindly furnished by Hoffmann LaRoche, Inc. of Nutley, N. J., and the authors are indebted to them for this supply. They were encapsuled under the direction of Mr. Loy Packer, a senior pharmacy student. The authors also wish to express their appreciation to the students and faculty members who cooperated in this program, and to Dr. H. C. Wood, Jr., Professor of Pharmacology at the Philadelphia College of Pharmacy and Science, and to Dr. Julius Neumueller of the Pennsylvania State College of Optometry, for suggestions and advice.

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Notice

The article by T. Swann Harding, "Cosmetics Today," published in the February issue, was submitted by the author as a private citizen and it does not, of course, represent the official opinion of the Department of Agriculture.—*Editor*.

BELLADONNA CULTIVATION IN EASTERN WASHINGTON

By Morris Wolfred, M. S.*

AS the present war continues to deplete our supplies of many botanical drugs, and the literature continues to encourage the cultivation of such drugs within the United States, the enthusiasm to "grow our own botanicals" has increased. Out of the zeal of the many who have been anxious to relieve the shortages, there have been some successful Belladonna projects and some failures. One successful project has been the large acreage Belladonna cultivation project in the Palouse area of Eastern Washington (1). This is a report of the procedures followed in the successful cultivation of Belladonna plants in this fertile region from the field experiences of the author so that others who are about to undertake the cultivation of Belladonna may gain information beforehand of some of the problems and techniques involved.

Seed Germination

Belladonna seeds were selected in the same manner as any other seed, basing the selection on past records of germination and viability. A stock of good seed should be at least 80% viable. These were germinated in the latter part of winter for the Palouse area project. Seeds as old as twenty years were germinated with excellent results. Contrary to reports in the literature, new seed used had a high percentage of germination when germinated under proper conditions. These seeds were previously treated for fifty seconds with concentrated sulfuric acid and washed immediately with plain water in order to soften the seed coat. The acid treatment accelerated the percentage of germination, but did not increase the number of viable seeds. Seeds were then allowed to dry and then treated with one of the following fungicides: Ceresen (2% ethyl mercuric chloride), New Improved

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Ceresen (5% ethyl mercuric phosphate), Cuprous Oxide, or Calomel. This was done by placing both the seeds and fungicide in a tight container and shaking them vigorously until all the seeds were thoroughly coated. The excess material was then screened off. Next the seeds were scattered on flats previously prepared with rich garden loam which had been sterilized with steam or boiling water and mixed with 10% peat moss, with a thin layer of sand added to the surface. A higher percentage of peat moss was not desirable because "damping off" takes place. This is a diseased condition which affects both the seed and young *Belladonna* plant before and after the seedling comes through the ground. Approximately one gram or 1000 of the selected seeds was used for each flat.

The flats were then placed in a greenhouse and allowed to germinate in indirect sunlight. They were watered at necessary intervals to insure ready moisture, but an excess of water was avoided.

The plants germinated slowly and irregularly within a few weeks and were allowed to continue growth until they reached approximately one and one-half inches in height. They were then transplanted to other flats and allowed to grow until they attained a height of from five to six inches. The time required to reach this stage of development is variable, requiring six to ten weeks.

If an excess of seed is on hand, the plants need not be transplanted, provided the weak and non-viable plants are removed from the flat. This allows the strong viable seedlings to increase their growth, leaving approximately 150-250 strong plants in each flat. This method should be avoided where one has only a small amount of seed and where seed is hard to obtain. For those growers who have obtained their seeds from previous crops such a method is very desirable, as it is time-saving and lowers the production cost of the individual plant.

Planting

When the *Belladonna* plants reached a height of five to six inches and all danger of frost was past, they were then transplanted to the open field. The field available for the project consisted of an alkaline-rich soil neither sandy nor clay-like. It was free from hard clots and was rich in nitrogen. Peas, clover, or other leguminous plants were grown in this area prior to use in order to insure sufficient amount of nitrogen in the soil. A nitrogen-rich soil is almost a necessity. Many authors recommend the use of commercial fer-

tilizers containing 12% phosphate, 4% nitrates, and 4% potash applied at rate of 400-600 pounds per acre. An excellent crop was attained without the use of any fertilizers during the experimental growth procedure.

The layout of land in any Belladonna field should be such that proper drainage is assured. It has already been established that too much moisture will retard the growth of the Belladonna plant and will also cause splitting and decaying of the roots (2). Excessively hard soil and rocky soil will also retard the plant's progress. Our experience indicated that the soil should depend on subterranean irrigation rather than surface irrigation. In any case the soil should be able to retain its moisture.

Prior to planting the field was ploughed deep and harrowed thoroughly to remove any weeds. This made a top of three to four inches of fine loose soil. The field was then lined both horizontally and vertically by tractor with the lines spaced at about three to three and one-half feet. It has been found that three and one-half feet is better for spacing these plants as the Belladonna plant becomes quite large in its second year's growth.

The Belladonna plant was transplanted, using a method identical with that used in tomato plants. A hole was scooped out with a trowel and watered. The entire plant with all attached root hairs and surrounding earth was taken out of the flat carefully and placed in this watered hole. The earth was then pushed up against the transplant, forming a solid unit. The young Belladonna plant should not be watered in the bright sunlight, but in the evening when it is cool in order to prevent rapid drying of the tender plant. It was also found that the young plant need not be shaded after transplanting as it immediately begins to draw moisture from the surrounding soil and readily recovers in a few days; however, shading might be desirable in many areas where the sun is extremely bright. A heavy night dew is ideal for the young plant and greatly speeds up its growth. Where subterranean irrigation exists, the plants need no watering. This was the condition found in the Palouse project. The day following transplanting the young herb should be dusted with 3-4 per cent. rotenone powder to prevent attacks from insects.

Growth and Environment

Atropa belladonna L. flourishes well during its growth period in an environment which has warm days and cool nights. The plant

may be grown in the shade or in the sun, but the author's experience has shown that a better plant, one that is larger and stronger, may be obtained when grown in good sunlight.

Cold winters did not materially affect the Belladonna roots when they were left in the ground from the previous summer. In fact, an excellent crop was attained from these roots the following year.

The general chemical composition of the type of soil found in the Palouse area is shown in the accompanying Table (3).

TABLE

Depth in Inches	CaO%	MgO%	K ₂ O%	P ₂ O ₅ %	SO ₃ %	N ₂ %	Organic Matter %
0-20	1.77	0.76	2.34	0.28	0.03	0.13	2.18
20-33	1.61	0.95	2.06	0.30	0.02	0.12	0.96
33-62	1.65	1.04	2.06	0.16	0.02	0.05	0.46

Experience in the field supports the fact that a soil which contains regular drainage, sufficient porosity, proper mineral constituents as above, and room for root expansion aids greatly in the prevention of fungus attack.

The Belladonna plants became quite hardy once they began their growth in the field. The plants did not die even following fracturing of the main stems and portions of the root. Some plants were allowed to be grown without cultivation, surrounded by weeds. These survived and increased quickly in size as soon as the weeds were removed. Weeds, however, should be continuously removed from the crop for best results.

Insect Attacks

There are two species of flea beetles that often attack the Belladonna plants: the potato flea beetle (*Epitrix cucumeris* Harr.) and the Western flea beetle (*Epitrix subcrinita* Lec.). The former is probably the more important of the two species for the country as a whole, but the latter occurs solely in Eastern Washington. The flea beetle flourishes well on the Belladonna leaves, and great damage is caused by the feeding of the adult beetles on the foliage. These insects are effectively controlled by spraying the leaves and stems of the plant with 0.75 per cent. of powdered rotenone. This was applied at seven or ten-day intervals throughout the growing period. Since the flea beetles fed on both surfaces of the leaves, the spraying was

adjusted so that the undersurface of the leaves were well covered with the powder. The flea beetle can be easily controlled once its life history has been established in the locality where the Belladonna is under cultivation. In Eastern Washington, the insect completes one generation and a partial second generation annually.

Belladonna plants were also susceptible to attacks from aphids. These were found mainly on the shady undersurface of the leaves. Such insect attacks can be effectively controlled by spraying the plant with a dilute mixture of 200 cc. of nicotine sulfate in 50 gallons of water to which soap has been added. The rotenone spray was found to be unsatisfactory for destroying aphids.

Cultivation

With very young plants hand cultivation was necessary to prevent the crowding out by weeds. Later the plants were cultivated every ten days. This prevented the growth of weeds and loosened the soil around the plants. It was found that at first the cultivation need not be deeper than two to three inches, but as the plants advanced in growth deeper cultivation was found to be essential. Second year plants require cultivation of about six inches, which rapidly augments the growth of the plant. During the hot dry summer, shallow cultivation is best in order to conserve the moisture in the soil. The cultivation may be done with a tractor spanning the rows or with a pair of horses, but as the plant reaches full growth, horses are more practical because they do less damage to the large plants.

Harvesting

The Belladonna leaves and tops were harvested when the plant began to flower prior to the leaves' turning yellow. During this period Belladonna leaves have been found to contain their maximum alkaloidal content (4). Large leaves were removed from the plant first, leaving the small ones to mature. In this manner it was found possible to obtain three crops of leaves in one summer. The leaves were picked in such manner as to avoid bruising. The stem was left intact. As the leaves were picked they were placed in baskets and sent to the drier. In some cases time was saved by cutting the entire plant and stripping the leaves after the plants had been brought in from the field. Harvesting involves the greatest amount of hand labor for the leaves have to be carefully collected. Such

labor necessarily involves one of the greatest expenses in the production of Belladonna in the United States.

At the end of the harvest period, after all leaves had been stripped from the plants, the stems of first year plants were slightly trimmed down but not cut off, near the root. This enabled the roots to remain dormant during the winter and a new stem to arise in the spring. The stem was left intact and visible in order to indicate where the Belladonna roots lay, so that the weeds could be removed in the early spring without difficulty or damage to the plant. Belladonna plants emerged later and grew more slowly than did the weeds the following spring. It was found also that the plants with stems left uncut came up more rapidly than those which were cut close to the ground.

The roots were harvested at the close of the third year in the autumn. They were ploughed up in a manner similar to harvesting potatoes. The roots were washed to remove the clinging soil, split lengthwise or chopped into small places, and sent immediately to the drier.

Drying

The leaves and roots should be sent at once to the drier and kept at a constant dry heat of 50° to 60° C. One should not attempt to dry any considerable quantity of Belladonna leaves in an air-ventilated building which depends on weather conditions.

A suitable type of drying apparatus as described in the *Farmers Bulletin* No. 1231, in which artificial heat is used, has proved most successful (5). In the drying the plant loses approximately 82% water.

Belladonna leaves and roots left standing undergo changes in which the leaf darkens and deterioration of the alkaloid takes place, resulting in an inferior product. It has been further concluded by Todd that enzymes are responsible for the disappearance of the alkaloid (6). Care was taken during the project not to allow the leaves and roots to stand more than one or two hours before drying them.

Alkaloidal Assay

Representative samples of Belladonna leaves and roots grown in the Palouse area were assayed for alkaloidal content, using the U. S. P. XI methods as for *Hyoscyamus* (7), and they were found uniformly to meet the U. S. P. XI requirements for *Belladonnæ Folium* and *Belladonnæ Radix*.

Summary

Belladonna can be grown successfully in Eastern Washington, yielding leaves and roots which will meet and even supersede our new U. S. P. XII requirements.

The successful growing of Belladonna is contingent upon careful attention to the following factors: proper soil constituents, selective and tentative treatment of seed, adequate care of young plants in germination and transplantation, careful cultivation with suitable precautions against insect attacks, adequate water supply, and finally harvesting of the leaves at maturity with immediate drying in a suitable drier.

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6. Todd, J. P.: "The Stabilization and Fermentation of Belladonna Leaves," *Pharmaceutical Journal*, 124:94 (1930).
7. *United States Pharmacopæia*, Eleventh Decennial Revision, 193 (1936).

PHARMACY A PROFESSION*

By E. Fullerton Cook, Ph. M.**

IF I were to paraphrase an ideal recently expressed in reference to the global war and its aims, it would be "We want a specific and inspiring program for a better pharmaceutical world that will send us singing down the road to victory". Are we courageous enough and wise enough to take this road? Difficulties are on every side, seemingly insurmountable obstacles are in the way, economic interests block the path, but increasingly we feel the pressure of idealism, of forceful, clear-thinking leaders in our profession, and the surge of progress in the fundamentals of human relations. It is in the atmosphere of today—it is the spirit of world revolution which is sweeping the earth, advancement will not be denied and the only satisfactory answer is one based upon the fundamental principles which have kept pharmacy in the picture for 4000 years, side by side with medicine.

Pharmacy has always been as it is today, "an essential medical specialty". Its foundations rest on eternal, scientific truths and on decent, helpful, human relations. The code of conduct of the medical profession is built on the recognition of human need, upon the innate desire of the human heart to aid those in distress, and upon the realization that this can only be done when those who serve are unselfish, and both willing and able to act intelligently and efficiently, utilizing the aids which science and experience have brought to their hand in this marvelous age. Pharmacy and all of its constituent sciences have not lagged behind medicine, either in ideals or in the acceptance of modern science. Pharmacy as a profession or as a science has nothing to be ashamed of.

Throughout its 4000 years of history, pharmacists have been pioneers in botany, pharmacology, chemistry, physics, and the other basic sciences which underlie so much of the great progress in the therapeutics of today, whether it be in the fields of antiseptics, anes-

* Presented before The Connecticut Association for the Advancement of Professional Pharmacy, New Haven, Conn., Feb. 23, 1943.

** Chairman of the Revision Committee, United States Pharmacopœia.

sia, chemotherapy, immunology or serology. Every pharmacist has a right to be proud of the conduct of modern pharmacy in every division of practice, as exemplified by many outstanding representatives.

Pharmaceutical manufacture is an example of the highest development of pharmacy, and a visit of anyone, whether physician, pharmacist, drug inspector, or layman, to any of the many pharmaceutical, chemical, or biological laboratories where modern medicines are made, will astonish those who are not aware of the great advance that has been made. Every known development of modern science is called upon by highly trained specialists in the variety of fields of modern knowledge, to originate, manufacture and standardize aids to the medical profession which make possible the great advance in health and longevity for many people. Anesthetics and surgical supplies make possible the operating skill of the surgeon. Plagues, infant mortality, and almost certain death are swept away because of diphtheria antitoxin, Insulin, liver injections, and drugs of the sulfonamides group, and a hundred other medicines of almost magic power.

Here we have nothing to be ashamed of in the profession of pharmacy; the ideals are being maintained, the future is bright and the standards are right. The wide-awake leaders in this field of pharmacy know that good medicine must be based upon dependable, scientific, biological and clinical proof, if it is to survive, and that any successful pharmaceutical organization today must be built upon such a foundation.

Hospital pharmacy has also in our day reached a new height of accomplishment. The modern hospital pharmacist is scientifically trained in his profession; he has a keen sense of his responsibility under the code of pharmacy which strictly parallels that of medicine; he is courageous, honest and efficient. The pharmacists, by virtue of his importance to the medical service of the hospital, holds an honored place on the medical staff. He has the fullest confidence and respect of everyone in the hospital; he meets regularly with the medical staff, and is their authority and guide on all matters therapeutic. He buys the medicines approved for use in the hospital by the joint decisions of the medical-pharmaceutical staff; decisions made, first upon their efficiency and importance, but always with a rigid check upon their economic advantage to the hospital; he supervises the manufacture of many of the simpler medicines required by the hospital, which often

results in substantial savings due to the availability in the hospital of tax-free alcohol. The pharmacist supervises the dispensing and the quality of all medicines; manufactures, sterilizes, and tests all parenteral solutions for use in the hospital; controls the narcotics, and often prepares other products needed in hospital management, such as floor wax, cleaning fluids, etc. This highly efficient type of pharmacist is in a position to save thousands of dollars yearly to any hospital where he serves and he is commanding a salary commensurate with his services. Hospitals the country over are asking for such pharmacists.

What about the pharmacist in community practice? Where there is a professional building with many physicians and dentists under one roof, as well as in many communities, able pharmacists are rendering a service in every way paralleling the service just described for the hospital pharmacist. This is no dream; I have seen many such pharmacists at work, their remuneration is more than adequate, and their satisfaction in rendering such service is soul-satisfying. They are truly professional in spirit and service.

Now these are facts—there is nothing the matter with some of our pharmaceutical practice today. Many colleges are turning out splendid young men and women; the educational standards as set forth in the Pharmaceutical Syllabus is creditable and some graduates are taking advantage of the splendid graduate courses offered by many of our colleges.

What then is wrong with pharmacy of today? Some time ago it was suggested that every drug store should analyze itself and find out if it could possibly improve its own service. It is a good practice for every one to take the time periodically to "take stock". If the resulting inventory shows no profit the wise man calls in an expert, finds out the defects, drastically adjusts his situation and insures success the next year. Unless he is stupid or incompetent, he will bend every energy to correct the trouble. It is human to strive for success. It is a powerful motive in most worthwhile people, for it means far more than money; it means position, reputation, honor, and a rare satisfaction.

Suppose you were to make such an analysis—what would you find?

What have you done this year to advance your professional knowledge or skill?

1. Have you regularly and intelligently read your professional journals and used some of the many new suggestions? There have been hundreds of valuable ideas—there was never so much of medical interest in therapeutics nor so many valuable drugs.

2. Have you gone to your professional association this year and to the local medical society meeting to meet the doctors, learn to talk to them, let them know you, hear what they are interested in?

3. Have you taken advantage of the three or four days of "Refresher Courses" offered by some College of Pharmacy?

4. Have you contributed a paper on your profession to your pharmaceutical society? Or to the local medical society?

5. What professional books and new pharmaceutical equipment have you added to your pharmaceutical library and laboratory this year?

6. Have you every up-to-date book in pharmacy in your library and some medical books? (Goodman and Gilman, New and Non-Official Remedies, and Useful Drugs, etc.)

7. Do you know how to make buffered eye waters and isotonic ophthalmic solutions, and do you have a sanitary separate department for this work, and have you told all of the eye specialists in your neighborhood about this service? It is bringing a lot of new business to wide-awake pharmacists.

8. How about sterile products? Have you a small water still to make fresh lots of "Water for Injection"—every day—water which is pyrogen free and suitable for use in preparing Isotonic Solution of Sodium Chloride ("Normal Salt"), Isotonic Solution of Three Chlorides ("Ringer's Solution"), Anticoagulant Solution of Sodium Citrate for use in blood transfusion, Dextrose Injection and dozens of other parenteral solutions, which the doctor needs in his office, and the hospital must have?

The doctor is looking for this type of service, and it pays you well in dollars and cents.

9. How about a small manufacturing section out in the open, where the doctor and the public can see it? It has to be clean and well-equipped, but it will prove both economical and splendid publicity for your professionalism.

I have no sympathy with the pharmacist who keeps talking about the tax on alcohol which makes it impossible for him to compete with the large manufacturer. This is usually a convenient excuse for

not doing what he knows well enough he should be doing. I would like to read you a letter which came to my desk a few days ago. The writer condemns all of pharmacy because he cannot get alcohol tax-free. I would like to ask this man if he is making peppermint water, syrup of orange, belladonna ointment, and the hundreds of other largely used pharmaceuticals in which the alcohol-tax can be forgotten.

A small manufacturing laboratory gives you pride in being a pharmacist, gives you something to talk about to your physician friends, proves that you are a real pharmacist, and gives you a local reputation as a scientific man.

10. Are you making up stains and diagnostic reagents for the doctors in your vicinity? The new N. F. has a splendid list with formulas. Here is a real opportunity to prove to physicians that you are a pharmacist.

11. Do you understand allergy and are you ready to supply your doctors with the necessary equipment and obtain for his patients the necessary curative material? I have pharmacist friends who have made this an important department and found it very profitable.

12. Have you fitted up a special department to meet the constant needs of the diabetic patient? Insulin (and don't forget to always keep it in the refrigerator), Insulin syringes, injectors and needles, sugar-test outfits, saccharin, dietary scales, etc., are but a few of the articles. There are dozens of persons in your neighborhood who need your help in this field and the physicians should know that you are an expert and will serve their patients honestly and intelligently.

13. The Baby Department.—There are doubtless many homes in your vicinity today where they are expecting a baby. Your baby department should be complete to the last detail of baby's needs and your circular about your personal, skilled services, or that of perhaps a trained woman clerk in your store would bring you hundreds of dollars worth of business. Why let this go to the department store or to the specialty shop?

These are only a few of the many highly professional departments open to every real pharmacist in every community today. I have not mentioned the prescription room, the home medicines, sick-room supplies, first aid, chemical testing glassware, infant and invalid foods, biologicals, antiseptics, germicides and disinfectants, veterinary medicines, insecticides and rodent poisons, etc., etc.

This picture truly represents real pharmacy, successful pharmacy, efficient, up-to-date pharmacy, profitable pharmacy. It calls for alert,

well-trained, progressive pharmacists to practice it. It represents the ideals and the dreams of most of those who have been trained in pharmacy.

May I now come back to my first statement: "Are we ready and courageous enough to adopt a specific and inspiring program for a better pharmaceutical world, not only a few splendid oases in a desert, which will send us singing down the road to victory?" It is an individual problem—our pharmacy world will only be as idealistic as each pharmacist is willing to make it. It is possible, it has been done, you can do it! Let's make it a reality!

NARCOTIC REGULATIONS AMENDED

Effective December 21, 1942, the Regulations under the Internal Revenue Code relating to narcotics are amended to provide:

(1) If Ampoules or other hermetically sealed units containing a single dose are put up in packages of not more than 100 units, the tax may be paid on the entire number of units by affixing a stamp or stamps to the outer package or container. Previous regulations limited such packages to ten units.

(2) If officers of the Medical Corps of the Army or Navy in their treatment of military or naval personnel, or the members of their families entitled to receive such treatment, are unable to obtain from official stocks such narcotic drugs or preparations as they require, they may write a prescription for the patient and such prescriptions may be filled by civilian pharmacists. Such prescriptions must be written on official blanks or stationery, such as the printed forms of an army or navy hospital or dispensary, but since army and navy physicians are not required to register and pay a federal tax in order to prescribe narcotics, such prescriptions do not have to bear any registry number of the physician. The prescription, however, must bear the signature, title, corps and serial or jacket number of the issuing medical officer, in addition to other information required on a narcotic prescription. This provision does not apply to the treatment by an army or navy physician of patients other than those entitled to receive treatment from the doctor in his capacity as a service medical officer.

U. S. P. NOTES

A Further Modification of the Formula for Elixir of Phenobarbital and A Reduction Permitted in the Thread Count and Weight of Type I Absorbent Gauze

Elixir Phenobarbitali, page 155—To conserve glycerin during the period of the war and until rescinded by official action, use the following formula for Elixir of Phenobarbital:

(*Notice*—This formula supersedes the revised formula for this Elixir issued on November 20, 1942, as an "Advance Release" of the "Second U. S. P. XII Sheet Supplement". It was found necessary to still further reduce the glycerin.)

ELIXIR OF PHENOBARBITAL

Phenobarbital	4 Gm.
Tincture of Sweet Orange Peel ...	30 cc.
Solution of Amaranth	10 cc.
Alcohol	175 cc.
Glycerin	100 cc.
Sucrose	400 Gm.
Distilled Water, a sufficient quantity	

To make1000 cc.

Dissolve the Phenobarbital in the alcohol, add the tincture of sweet orange peel, the glycerin, the solution of amaranth, and distilled water to make 700 cc. Dissolve the sugar in this solution by agitation and add sufficient distilled water to make 1000 cc. Filter if necessary.

Note—If exposed to low temperature precipitation may occur. The precipitate may usually be redissolved by warming and shaking.

ALCOHOLIC CONTENT—From 17 to 20 per cent., by volume, of C_2H_5OH .

Carbasus Absorbens, page 114—During the period of the war and until rescinded by official action, U. S. P. Absorbent Gauze, Type I, may be made with 36 filling threads per inch instead of 40, and weigh 44.5 Gm. per linear yard instead of 46.8 Gm., and may be used in all U. S. P. articles where Type I Absorbent Gauze is directed.

SOLID EXTRACTS

Clear, Concise and Chosen for Their Interest

The Tin Salvage Institute reports that between April 1st, 1942 and January 1st, 1943, 2,300,000 pounds of collapsible tin tubes were received for reclamation. Already 680,000 pounds of tin has been recovered for the nation's stockpile of this critical metal.

AJP

A very radical suggestion was recently made in an editorial in the Journal of the A. M. A. with regard to the treatment given shock. First-aid procedures invariably advise the application of external heat for the prevention or treatment of shock. In contrast with this the Journal recommends that the patient be allowed to maintain the lowest safe level of temperature. The theory is advanced that the lowered skin temperature in shock is part of a complex adaptive mechanism quite analogous to the production of fever in infectious diseases and that this effort on the part of the body to compensate should not be defeated except in extreme conditions.

AJP

Sulfathiazole in the form of microcrystals as a 20 per cent. suspension applied on sterile gauze has been claimed to cure the troublesome *Impetigo contagiosa* in 24 hours. A drop or two of the suspension is poured on a small gauze dressing and this applied to the lesion. On removal 24 hours later the lesion was always healed and no further spread occurred.

AJP

A rapid method of adapting eyes to darkness has been announced by Soviet scientists. Ordinary methods requiring from forty-five to fifty minutes are replaced by a new technic which sensitizes the night vision in five to six minutes. The method, although not revealed in detail, includes weak excitations of the organs of hearing, taste or smell which apparently acts by some interaction of afferent systems. By appropriate treatment night vision can be increased 40 to 50 per cent.

Paint a room blue and the temperature seems cold; paint it yellow and it seems warm. So say those who have conducted practical experiments in offices. Workers who, in winter, complained of cold while working in a room painted blue, ceased their complaints when it was re-painted a warm yellow, although the temperature actually remained unchanged. However, in hot weather the blue room would seem cooler than the thermometer's register.

So while OPA directors urge people to "convert to coal," decorators might suggest "converting to yellow" for additional warmth.

AJP

The advertising of vitamins has for some time been quite colorful, but it remained for New York's Bronx Zoo to obtain colorful results from their use. It seems that the red flamingos in that institution were fading so that they were becoming indistinguishable from their white fellows. And so the birds were fed on a diet rich in vitamins and oils, resulting in the successful growth of beautiful red feathers again after the moulting season. But, unfortunately, the white flamingos were fed the same diet, and, believe it or not, after they moulted their colorless plumes their feathers grew in again bearing a beautiful light red color.

AJP

Science can be credited with a great deal of assistance in the tremendous job of assuring delivery of mail to our fighting boys overseas. What with the uncertainty of ocean travel, and the unnecessary bulk involved in shipping ordinary letter mail, the V-mail system of transporting letters on film by air is now the only safe and sure method of telling our soldiers on foreign soil what is in the hearts of those they left at home.

Letters written on the government's prescribed forms for V-mail are photographed on small rolls of film, transported by airplane, reproduced in the country of destination, and delivered promptly. Such a method utilizing scientific principles, is quick, saves censorship troubles and delays, reduces use of cargo space on ships, avoids shipping hazards, and allows the postal authorities to handle a tremendous volume of mail with a minimum of labor.

B O O K R E V I E W S

The Application of Absorption Spectra to the Study of Vitamins, Hormones and Coenzymes. By R. A. Morton, D. Sc., Ph. D., F. I. C.; Department of Chemistry, The University of Liverpool. Second edition. 226 pages. Adam Hilger, Ltd., London.

The author has been engaged in Absorption Spectra study since 1927 and in that time this subject has become a major tool of research as anyone who reads the literature is well aware. This book presents a review of some of the more interesting experimental results and conclusions based on adsorption spectra curves. Those interested in steroids, vitamins, hormones and coenzymes and their interrelationships will find this book most intriguing as will the many workers now engaged in fundamental research using the spectrometer as a tool of investigation. Your reviewer has found a wealth of information valuable to those who are interested in recent contributions in the field of biochemistry as relating to vitamins and hormones. The book, although small, contains a surprising amount of text and its preparation is on a level with many of the excellent English texts with which Americans are familiar.

L. F. TICE.

The Art of Compounding. By Justin L. Powers, Ph. D., Chairman of the Committee on National Formulary; Director of the American Pharmaceutical Laboratory; Editor of the Scientific Edition of the Journal of the American Pharmaceutical Association; and George E. Crossen, Ph. D., Dean and Professor of Pharmacy, Drake University. Seventh edition. The Blakiston Company, Philadelphia, Pa., 1943. 457 pages, 57 illustrations. Price: \$4.75.

The seventh edition of Dr. W. L. Scoville's well-known text has been materially decreased in size, and the order of presentation of some of the material has been altered. The curtailment in the number of pages has been brought about chiefly by the deletion of some of the material contained in the introductory chapter and the chapters devoted to biological products, vitamins, and incompatibilities.

While it is true that the discussion of incompatibilities has been compressed from 165 pages in the previous edition to a total of 89 in the present, it is not necessarily to be inferred that this important subject has been slighted. The authors have done a creditable piece of work in revising this material; it is now rationally divided into three separate chapters covering, respectively, general considerations, therapeutic and physical incompatibilities, and chemical incompatibility. In addition, the phase last named is treated by considering the cations in groups according to their arrangement in the periodic table, and taking up the anions alphabetically. The incompatibilities of organic substances are arranged alphabetically, the English title being used where the substance is official.

The chapter dealing with adjusted solutions has been enlarged to include several of the methods for calculating the freezing points of solutions. The table of tonic equivalents on page 171 has been added.

The first part of the chapter on emulsions has been rewritten so as to include a presentation of the current theories on emulsification. The material on emulsifying agents has been somewhat condensed.

A little new material on enteric coatings has been added to the chapter on pills, with references to the literature. The section on excipients has been condensed.

The chapter on ointments, cerates, and plasters has been brought up to date; a brief discussion of hydrogenated ointment bases is included, and the order of presentation has been altered.

Most of the remaining chapters are identical in text material with those of the sixth edition. In some the paragraphing has been changed slightly, but for the most part page after page has been taken verbatim from the older work. The same prescriptions and comments which appeared previously have been used in the present edition, but in some chapters the number has been reduced. As before, prescriptions from state board examinations are included in the appropriate chapters, with a key to these after the last chapter.

An erroneous statement concerning the solubility of salicylic acid in water (given as 0.1 Gm. in 460 cc.) appears on page 85, having been carried over from the previous edition.

This time-honored book should continue to be of service to the student of pharmacy, and especially because of the changes indicated previously, it will be a useful reference work for the practicing pharmacist.

A. A. DODGE.

TWO PALATABLE AND

Eskay's Neuro Phosphates



Each adult dose, 2 fluid drams (2
teaspoonfuls), contains in acid state:

Alcohol 15 per cent

Strychnine glycerophosphate,
anhydrous $\frac{1}{4}$ grain

Sodium glycerophosphate . 2 grains

Calcium glycerophosphate . 2 grains

Phosphoric acid 1.5 minims

This formula even on paper,
instantly appeals to the physician as a
judicious combination of recognized
tonic ingredients. But the product itself
is far more than a formula on paper.

Its scrupulous compounding, delicate
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Doctors have been prescribing Eskay's Neuro Phosphates
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EFFECTIVE TONICS...

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The Formula of Eskay's Neuro Phosphates, plus Vitamin B₁

Each adult dose, 2 fluid drams (2 teaspoonfuls), contains in acid state:
Alcohol 15 per cent
Strychnine glycerophosphate,
anhydrous $\frac{1}{4}$ grain
Sodium glycerophosphate . 2 grains
Calcium glycerophosphate . 2 grains
Phosphoric acid 1.5 minims
VITAMIN B₁ (thiamine hydrochloride) (.75 mg.) 250 U.S.P. Units

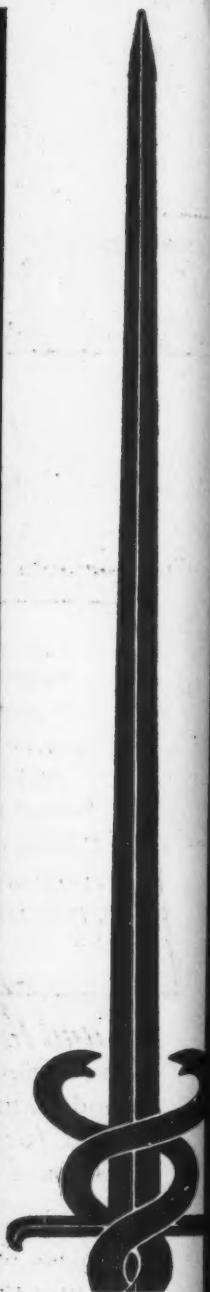
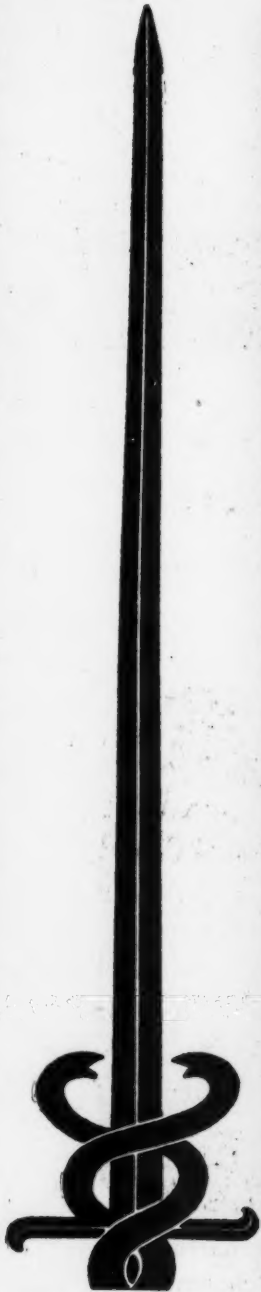
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Eskay's Theranates is not intended to replace Eskay's Neuro Phosphates. It is, rather, particularly indicated where the physician suspects a B₁ deficiency.

An exceptionally large quantity of Vitamin B₁ has been added to Eskay's Theranates—the equivalent, in adult dosage, of 750 U.S.P. Units daily.

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160,000 Americans die of cancer annually. Authorities say many of these deaths could be avoided.

Help us spread the knowledge that cancer can, in many cases, be cured. Enlist today in your local unit of the Women's Field Army.

In the Metropolitan Area, address the
New York City Cancer Committee
130 East 66th Street

AMERICAN SOCIETY FOR THE CONTROL OF CANCER

350 MADISON AVENUE, NEW YORK CITY

3
NC

American Journal of Pharmacy

The American Journal of Pharmacy is the oldest continuously published scientific periodical of its kind in America, having been established by the Philadelphia College of Pharmacy in 1825. After the original issue there were three other preliminary numbers until 1829, when regular publication began. From then until 1852 four issues were published annually, with the single exception of 1847, when an additional number appeared. Six issues a year were printed from 1853 to 1870, at which time the Journal became a monthly publication.

Former Editors of the Journal have been: Daniel B. Smith, 1825-1828; Benjamin Ellis, 1829-1831; Robert E. Griffith, 1831-1836; Joseph Carson, 1836-1850; William Procter, Jr., 1850-1871; John M. Maisch, 1871-1893; Henry Trimble, 1893-1898; Henry Kraemer, 1898-1917; George M. Beringer, 1917-1921, and Ivor Griffith, 1921-1941.

Established and maintained as a record of the progress of pharmacy and the allied sciences, the Journal's contents and policies are governed by an Editor and a Committee on Publications elected by the members of the College.

Manuscripts should be sent to the Editor, who does not assume any responsibility in connection with the views or investigations of contributors of accepted manuscripts, other than to exercise general care in selection.

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★ in two years nine months (April, 1946), the ★
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